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NEXUS OF RISK AND STABILITY IN ISLAMIC BANKS DURING THE PANDEMIC: EVIDENCE FROM INDONESIA

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ABSTRACT

This paper analyzes the effect of liquidity risk and credit risk on Islamic bank stability and whether the risk-stability nexus changes during the Covid-19 pandemic. Using a panel quarterly dataset of 14 Islamic banks from 2017 to 2020, a total of 224 quarterly-bank observations in total and the system generalized method of moment, we find that credit risk and liquidity risk are negatively associated with bank stability. Moreover, the COVID-19 does not alter the negative relationship between liquidity risk and stability. To validate the results, we also estimate the model using the LSDVC. The LSDVC results remain consistent. These results provide new insight into understanding risk management implementation for minimizing these risks.

Keywords: Credit risk, Liquidity risk, COVID-19 pandemic, Islamic banking.
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I. INTRODUCTION

The COVID-19 outbreak is detrimental to many sectors. As a result of lockdowns to contain the spread of COVID-19, economic activities have been put into a halt or greatly disrupted. The financial sector has not been spared by the outbreak of this health crisis (Aldasoro et al., 2020; Goodell, 2020). Some studies confirm that the outbreak leads to stock market crash (Mazur et al., 2021; Topcu & Gulal, 2020; Zhang et al., 2020) and banking instability (Elnahass et al., 2021; Park & Shin, 2021). Financial institutions also face increasing liquidity risk, loan defaults, and reduction in intermediation income (Rizwan et al., 2020). Banks experiencing reduced liquidity have suffered from larger-than-usual price declines in the securities market, indicating an increase in the interbank liquidity premium (Demirgüç-Kunt et al., 2020).

To maintain economic soundness, financial authorities around the world implement various policies and intervention. In the context of Indonesia, these policies include credit restructuring to ease borrowers to pay off their loans. While this may help containing loan default, banks can still suffer from non-performing loans and liquidity shortage in the long run (Ari et al., 2021) making them to be more vulnerable to shocks and consequently the financial system to be more unstable.

Our empirical investigation concerns risk-stability relations during the COVID-19 pandemic. Ghenimi et al. (2017) and Djebali & Zaghdoudi (2020) suggest a negative effect of credit risk and liquidity risk on bank stability. A decrease in the loan quality increases the likelihood of bankruptcy. Meanwhile, if the banks lack liquid assets, they may have difficulty in dealing with the possibility of a bank run. However, Gupta & Kashiramka (2020) mention that the bank's intermediary function, on one hand, increases the probability of liquidity shortfall but, on the other hand, promotes macroeconomic soundness leading to the stability of the banking system. From this explanation, the nature of risk-stability nexus is inconclusive.

In a dual-banking-system, arguably, the risk-stability relation differs between Islamic and conventional banks. Hassan et al. (2019) find a negative effect of liquidity risk on the stability of only Islamic banks. This finding is also supported by Smaoui et al. (2020). Meanwhile, another investigation shows that Islamic banks are more exposed to credit risk than conventional ones (Lassoued, 2018). Therefore, the risk-stability nexus can depend on the bank's operational principles.

The contextual relationship between risk and stability can also be affected by adverse shocks. Mahdi & Abbes (2018) explore the link between capital, risk, and liquidity during the 2008 Global Financial Crisis. Elnahass et al. (2021) confirm that the COVID-19 lowers financial performance and increases risk in the global banking system. Moreover, Park & Shin (2021) identify capital outflow from emerging economies caused by bank instability during the pandemic. The negative impacts of the pandemic on banking stability are less in countries that have a higher market share of Islamic banks (Danisman et al., 2021; Elnahass et al., 2021).

Adding to the aforementioned literature, this study focuses on Indonesian Islamic banks. Being a Muslim-dominated economy, Indonesia has promising prospects for Islamic banking. Although the Covid-19 pandemic distresses the

financial industry, Indonesian Islamic banks show fitness based on their solvability (capital adequacy ratio/CAR) and non-performing loan (NPL). Indonesia's Financial Services Authority (2021), which is known as OJK, records that the CAR of Islamic banks during 2020 is still stable at 20-21%. Meanwhile, the NPF decrease from 3.35% in May 2020 to 3.13% in December 2020. It is seen that the ability to manage loan assets during the Covid-19 pandemic is still well maintained. On the liquidity side, the loan to deposit ratio (LDR) tends to be below the threshold rate required by Bank Indonesia, which is 80-100%. A low LDR indicates a low probability of a bank's liquidity shortfall.

The rest of the paper is structured as follows. The next section reviews the literature. Section III presents the methodology followed by discussion of results in section IV. Finally, section V concludes and provides some recommendations.

II. LITERATURE REVIEW

2.1. Theoretical Background

As a financial intermediary institution, a bank does not have a role in money creation individually. The process must involve many banks collectively by expanding new loans (Werner, 2016). It is related to the delegated monitoring theory in which banks that act as delegated monitors provide agency services on allocating deposit funds into loans assets (Diamond, 1984). By collecting private information, banks charge fees to compensate for the cost of the services.

Liquidity risk is the probability that a sudden surge in liability withdrawals thus forces banks to liquidate assets in a short time and at a price less than the fair market price. When liability holders, such as depositors, demand immediate cash for their financial claims, bank can suffer liquidity shortfall. Acharya & Mora (2015) suggest that liquidity shortfall is relevant with bank soundness. In turmoil periods, increased liquidity will reduce stability but during normal times, it does not affect stability (Wagner, 2007). Meanwhile, the credit risk is defined as the probability of a borrower's failure to settle liabilities under agreed terms (Saunders & Cornett, 2014: 281). The primary issue is that the debtors do break their commitment in the terms of the contract thus are unable to pay off their loan at a determined date. This risk can also exist in Islamic banks (Ferhi, 2018).

Theoretically, credit risk and liquidity risk are closely related (Bryant, 1980; Diamond & Dybvig, 1983) since a bank play an intermediary role transforming liquid liability (funding) into illiquid loan. This typically exposes banks to liquidity risk, which can be more substantial during unfavorable periods. The disruption in economic activities as a result of lockdowns during the covid-19 plague forces potentially triggers an exponential increase in non-performing loan leading to deterioration in profits or even to losses. In the long term, depositors' trust declines so that it triggers bank runs in which depositors withdraw their fund from the bank because of the fear of bank failure.

In order to preserve liquidity shortfall and insolvency, banks under normal circumstances can seek fresh fund from the money market. However, during crisis episodes, financial funds become scarcer and, if there is any, lenders will charge high interest rates. In the end, the option to liquidate assets at fire-sale price

becomes inevitable. In sum, credit risk has significant implication to liquidity risk and bank instability (Diamond & Dybvig, 1983).

2.2. Previous Studies

The problem of bank stability has received much attention from researchers. The negative effect of risks on bank stability has been analysed in several studies. Wagner (2007) argues that liquidity risk has a negative impact on bank stability. Higher liquid assets, initially, improve the stability of the bank and make the crisis less costly. While Čihák and Hesse (2010) document no relationship between liquidity risk and stability for larger Islamic banks, their relation is significant and negative relationship for small Islamic banks.

Hassan et al. (2019) examine the impact of liquidity risk on bank stability using 26 Islamic Banks and Conventional Banks from selected Organization of Islamic Cooperation (OIC) countries. They find a negative effect of liquidity risk on bank stability. Surprisingly, during post subprime financial crisis, the negative effect is evidenced only for Islamic banks. The result indicates that higher liquidity risk reduces bank stability.

In a different context, Imbierowicz and Rauch (2014) analyze the relationship between liquidity and credit risks and their joint impact on banks' probability of default for 4300 US commercial banks. They find that there is a joint and negative effect of the interaction between liquidity risk and credit risk on bank stability. In line with this, Ghenimi et al. (2017) discover a negative effect of liquidity risk and credit risk individually and jointly on bank stability in MENA region. These results indicate that liquid banks are more stable. Liquid assets enable banks to deal with unexpected cash withdrawal problems that can affect banking stability. From the credit side, higher credit risk will lead to bankruptcy.

On the other hand, Zaghdoudi (2019) provide contradicting results. They verify the positive effect of liquidity risk on Tunisian bank stability. As for credit risk, it has a negative and significant impact on the stability when it is proxied by Z-score. Indeed, Djebali and Zaghdoudi (2020) examine the relationships between bank stability-credit risk and bank stability-liquidity risk and show a non-linear relationship between both types of risk and stability, suggesting two optimal thresholds equal to 13.16% for credit risk and 19.03% for liquidity risk. The negative effect of liquidity risk on bank stability occurs when it is above the optimal threshold of credit risk.

Based on the theoretical and empirical evidence presented above, we believe that liquidity risk and credit risk may have played a role in the stability of the bank. On the other hand, Islamic banks have limited investment opportunities, they have high liquid assets so the liquidity risk is very low. Therefor our hypotheses for the risk-stability nexus are:

H1: Liquidity risk has a negative effect on the stability of Islamic banks
H2: Credit risk has a negative effect on the stability of Islamic banks

2.3. COVID-19 Pandemic as a Moderating Variable

The COVID-19 pandemic has sparked fears of an economic crisis and recession. Social restrictions, self-isolation, and travel restrictions have led to a reduction in the workforce in all sectors of the economy and caused many jobs to be lost. Schools have closed, and the need for commodities and manufactured products has decreased. On the other hand, the need for medical supplies has increased significantly. The food sector is also facing increasing demand due to panic buying behaviour and hoarding of food products (Nicola et al., 2020). The COVID-19 outbreak has caused countries in the world to experience a decline in economic growth or even a recession. For example, Singapore experienced a decline in GDP of 41.2% (Lestari, 2020). The Minister of Finance of the Republic of Indonesia, Sri Mulyani, stated that in the second quarter of 2020 Indonesia's economic growth was -4.3% (CNCB, 2020).

The banking sector has also been hit by the Covid 19 virus outbreak. At the end of April 2020, the stock prices of banks decreased to below the real sector share prices affected by the covid 19 outbreak. The suffering of banks during the outbreak of covid 19 was also more severe than with another crisis (Aldasoro et al., 2020). Aggregate liquidity becomes tight when a financial crisis occurs. This occurs as depositors and borrowers with unused loan commitments withdraw funds from banks to satisfy their liquidity and funding needs (Chen et al., 2021).

According to Al-Nasser Mohammed & Muhammed (2017) and Barber (2018), Islamic finance is safer than conventional finance and, thus, it is a system that is able to minimize the severity of financial crises. Islamic finance principles provide protection against risk. Empirically, Islamic finance shows its flexibility as evidenced by various comparative studies showing that the performance of Islamic banks is much better than conventional banks during the crisis period, Despite some other studies such as Hasan & Dridi (2010) and Bourkhis & Nabi (2013) suggest otherwise.

Ozili (2018) states that bank stability is not only influenced by credit risk and bankruptcy risk. It may also be shaped by events and institutions. This includes the COVID-19 pandemic. Therefore, the following hypotheses are proposed:

H3: The COVID-19 pandemic moderates the effect of liquidity risk on the stability of Islamic banks.

H4: The COVID-19 pandemic moderates the effect of credit risk on the stability of Islamic banks.

III. METHODOLOGY

3.1. Data

This section explains data source, variable definition, and analytical approach. We obtain the bank's quarterly financial reporting from 2017 to 2020 published by Otoritas Jasa Keuangan (OJK), which is Indonesia's Financial Services Authority. As our concern is on Islamic banks, we have 14 Islamic banks with 224 observations in total. Macroeconomic indicators (GDP growth and inflation rate) are from in Central Bureau of Statistics (BPS).

Table 1.
Denifition of Variables

	Definition
STAB	To measure bank stability (STAB), we utilize z-score as follow (Khan et al., 2017; Lepetit & Strobel, 2015): $STAB_{it}=\frac{ROA_{it}+ETA_{it}}{\sigma ROA}$ ROA (return on asset) is ratio of net profit to total asset; ETA is ratio of total equity to total asset; and σ_{ROA} is 3-quarter-rolling-window standard deviation of ROA. Since z-score tends to be skewed, it is transformed using natural log (Ibrahim & Rizvi, 2017; Khan et al., 2017; Lepetit & Strobel, 2015; Smaoui et al., 2020).
CRISK	Ghenimi et al. (2017) use the ratio of non-performing financing to total financing (NPF) to capture credit risk of Islamic banks. The NPF represents loan quality in which the higher the NPF is, the lower the loan quality becomes. Moreover, Ari et al. (2021) emphasize the potential increase in non-performing financing during or post pandemic times. The NPF can be defined as follow: $CRISK_{it}=\frac{\text{Non-Performing Financing}}{\text{Total Financing}}$
LRISK	Thornton & Tommaso (2019) calculate bank liquidity using the ratio of liquid assets to total asset. We group liquid assets (LIQ) into cash, fund placement in Bank Indonesia and other banks, and securities. The ratio of liquid asset to total asset indicates bank ability to meet liquidity demand and hence the higher the value, the less the liquidity risk is. In the paper, we multiply the liquidity ratio by -1 for ease of interpretation, where higher value reflects higher liquidity risk, as done by Khan et al. (2017): $LRISK_{it}=\left[\frac{LIQ}{\text{Total Assets}}\right]\times -1$
COV19	Since being declared a global pandemic by WHO on March 20, 2020, the 2019-coronavirus disease (COVID-19) has forced almost all countries in the world to implement lockdowns. In Indonesia, the government announced large-scale social restrictions and enforced them in April 2020. This policy was detrimental to the economy and triggered bank instability during 2020q2 - 2020q4. Hence, we include a dummy variable that is equal to 1 for the pandemic period and 0 otherwise.
SIZE	Ibrahim & Rizvi (2017) emphasize the role of bank size on stability in Islamic banks. While bigger banks benefit from risk diversification, they are subject to the moral hazard problem. Hence, bank size can positively or negatively affect to stability. Considering the factor, some empirical works include natural log of total asset as a control variable (Louhichi & Boujelbene, 2017; Smaoui et al., 2020; Sobarsyah et al., 2020)
LTA	Khan et al. (2017) use loan-to-asset ratio as a control variable.
LEV	Hirata & Ojima (2020) suggest that leverage ratio (debt-to-asset ratio) is a covariate of bank stability.
GDPG, INF	Economic growth and price stability are macroeconomic factors that determine bank soundness (Al-Khouri & Arouri, 2019; Danarsari et al., 2018). Thus, we include the quarter-on-quarter growth of gross domestic product (GDPG) and inflation rate (INF). GDPG is calculated from GDP at constant price whereas INF is from consumer price index.

3.2. Model Development

Some empirical studies highlight the relation between credit risk, liquidity risk, and bank stability in Islamic Banking (Djebali & Zaghdoudi, 2020; Ghenimi et al., 2017; Hassan et al., 2019). Meanwhile, Elnahass et al. (2021) empirically confirm their adverse effect on bank performance and stability in the global scope. Moreover, Danisman et al. (2021) find that countries with a high share of Islamic banking are less exposed to devasting impact of the pandemic outbreak. On account of the issues, we aim to explore the effect of the COVID-19 on the relation between credit risk, liquidity risk and Islamic bank stability.

We adopt Ghenimi et al.'s (2017) model to address our objective. Bank stability (STAB) is measured by the z-score (see Table 1). An increase in this indicator indicates a decrease in default probability and reflects bank stability against unanticipated capital loss subsequently. To measure credit risk, we use non-performing financing (NPF) as suggested Ovi et al. (2020) and Sobarsyah et al. (2020). Bank liquidity can be based on the amount of cash available to anticipate a potential bank run, withdrawing large amounts of deposit funds in a short time (Kim & Sohn, 2017; Thornton & Tommaso, 2019). We, therefore, utilize ratio of liquid asset to total asset (more detail in Table 1). COVID-19 dummy represents pandemic times ranging from 2nd to 4th quarter in 2020. With respect to Elnahass et al. (2021), we create interaction variables between bank risk and COVID-19 dummy to examine the risk-stability nexus during the pandemic.

3.3. Methods

We specify the following dynamic panel data model:

$$STAB_{it}=\beta_0+\beta_1 STAB_{it-1}+\beta_1 CRISK_{it}+\beta_2 LRISK_{it}+\beta_3 COV19_t+\beta_4 CRISK_{it}\times COV19_t$$
$$+\beta_5 LRISK_{it}\times COV19_t+\sum_{b=1}^{3}\delta_b BSC_{b,it}+\sum_{m=1}^{2}\theta_m MEC_{m,t}+\mu_i+\varepsilon_{it} \quad (1)$$

Our regression model is presented in equation (1) and detailed definition of each variable can be seen in Table 1. Bank-specific covariates (BSC) consist of LTA, SIZE, and LEV and macroeconomic covariates (MEC) contain GDPG and INF. We expect negatively significant value on β_1 and β_2. The moderating role of pandemic disease is identified from β_4 and β_5. We hypothesize that the COVID-19 strengthen negative effect of risk on stability so as β_4 and β_5 should be negatively significant.

We include bank fixed effect (μ_i) in our model to address heterogeneity issue and hence alleviate the omitted variable bias. Another issue is endogeneity due to potential correlation between the lagged dependent variable ($STAB_{it-1}$)and the fixed effect (μ_i). Moreover, $CRISK_{it}$ is associated with $LRISK_{it}$ so as both are not fully exogeneous (Ghenimi et al., 2017; Hassan et al., 2019). To overcome the issues, equation (1) is estimated using System Generalized Method of Moment (SYS-GMM) (Arellano & Bover, 1995; Blundell & Bond, 1998). The technique is arguably more consistent and efficient than the least squares method (Roodman, 2009).

As our sample is relatively small (14 banks, 224 in total observations), we utilize the one-step SYS-GMM (Hayakawa, 2007; Soto, 2005), which is also used

by Ledhem & Mekidiche (2021). Instead of using the differencing, we employ the orthogonal deviation as proposed by Arellano & Bover (1995). The SYS-GMM's validity is based on two parameters: Sargan's and the second-order of Arellano-Bond's statistics. The first parameter is to test the validity of instruments. The second is to ensure that the null hypothesis (no autocorrelation in error term) is not rejected.

In spite of its benefit to address some econometric issues, there is potential weakness of the SYS-GMM to estimate equation (1). Dang et al. (2015) highlight that the method is not reliable and sensitive to heterogeneity, autocorrelation, and changes in parameters in covariates. As a result, regression inference may be biased. The bias correction (we name it LSDVC, hereafter) proposed by Bruno (2005b) is arguably able to deal with that. Accordingly, we conduct robustness check using the LSDVC technique which is also suggested in recent studies (Boukhatem & Djelassi, 2020; Ibrahim & Rizvi, 2017). According to Bruno (2005a), there are three initial estimation methods, namely, Anderson-Hsio (AH), Arellano-Bond (AB), and Blundell-Bond (BB) and we choose the last one. Computationally, the standard error is estimated by bootstrapping method with 200 repetitions.

IV. RESULT AND ANALYSIS

4.1. Result

We report descriptive statistics in Table 2. Some indicators such as CRISK, LRISK, LTA, LEV, GDPG, and INF are in the percentage form. The absolute mean of LRISK is 0.123% which indicates low proportion of liquid asset to total asset. Moreover, the LTA have mean value in 61.98% and maximum value in 86.23%. Based on two indicators, Islamic banks are relatively aggressive on lending thus potentially run into the risk of liquidity shortfall. The pairwise correlation in Table 3 displays negative association between risk (LRISK and CRISK) and stability (STAB). It can be an initial indication before interpreting baseline regression in explaining the risk-stability nexus.

Table 2.
Descriptive Statistics

	Obs.	Mean	Stdev	Min	Max
STAB	224	0.108	0.770	-3.180	5.907
CRISK	224	1.340	0.656	0.320	46.55
LRISK	224	-0.123	0.253	-1.248	0.002
COV19	224	0.250	0.434	0.000	1.000
LTA	224	61.98	16.16	0.000	86.23
LEV	224	59.10	10.60	9.60	67.70
SIZE	224	16.29	1.24	13.40	18.66
GDPG	224	0.800	2.800	-4.200	5.000
INF	224	0.700	0.500	-0.200	1.700

Notes: To simplify our interpretation, LRISK is the product of liquidity ratio and minus one (LIQ x -1).

Table 3.
Correlation Matrix

	STAB	CRISK	LRISK	COV19	LTA	LEV	SIZE	GDPG	INF
STAB	1.000								
CRISK	-0.489	1.000							
LRISK	-0.381	0.378	1.000						
COV19	0.051	-0.047	0.033	1.000					
LTA	-0.404	0.524	0.745	-0.033	1.000				
LEV	-0.366	0.539	0.872	-0.047	-0.492	1.000			
SIZE	-0.148	0.261	0.529	0.077	-0.361	0.642	1.000		
GDPG	-0.042	0.006	-0.009	-0.273	0.031	0.003	-0.022	1.000	
INF	-0.014	0.043	-0.007	-0.312	-0.013	0.051	-0.019	-0.099	1.000

Table 4 exhibits baseline regression results. The fitness of the regressions can be seen in the second order of Arellano-Bond statistics (AR2) and the Sargan's value. The AR2 is insignificant so as there is no issue of autocorrelation in our models. Likewise, Sargan statistics is not significant so that the validity of overidentification is verified. In other words, the instruments are not correlated with the error term.

CRISK and LRISK have negatively significant coefficients at 1% in Column (1) and their values remain consistent in the others. Based on the results, H1 and H2 are accepted. COV19 is statistically insignificant. It indicates that there is no essential difference of stability between pre and during COVID-19 pandemic. In Column 3, we have positively insignificant coefficient of the interaction terms (LRISKxCOV19 and LRISKxCOV19). This contradicts our third and fourth hypotheses. Even if negatively associated with STAB in overall observation, the effects of LRISK dan CRISK on STAB do not change during the pandemic time.

Table 4.
Baseline Regression

	(1)	(2)	(3)
	STAB	STAB	STAB
L.STAB	0.160***	0.146**	0.125*
	(0.058)	(0.064)	(0.065)
CRISK	-0.442***	-0.431***	-0.455***
	(0.096)	(0.092)	(0.100)
LRISK	-1.400***	-1.317***	-1.211***
	(0.390)	(0.383)	(0.405)
COV19		0.154*	-0.280
		(0.085)	(0.337)
CRISK x COV19			0.363
			(0.227)
LRISK x COV19			0.351
			(0.538)
LTA	-0.011	-0.137	-0.340
	(0.528)	(0.532)	(0.556)

Table 4.
Baseline Regression (Continued)

	(1)	(2)	(3)
	STAB	**STAB**	**STAB**
LEV	2.154*	1.963*	1.603
	(1.164)	(1.132)	(1.191)
SIZE	0.002	0.007	0.015
	(0.049)	(0.049)	(0.050)
GDPG	-2.642**	-0.848	-0.795
	(1.229)	(1.498)	(0.918)
INF	-16.695***	3.148	2.882
	(5.583)	(10.109)	(10.165)
C	-0.637	-0.714	-0.453
	(0.809)	(0.803)	(0.817)
Obs.	203	203	203
AR2	-0.114	-0.187	-0.166
AR2 P-Val	0.909	0.852	0.868
Sargan Stat.	202.56	202.99	199.96
Sargan P-Val	0.179	0.173	0.185

4.2. Robustness Check

In this section, we estimate equation (1) employing the LSDVC approach. The results are presented in Table 5. Overall, our earlier conclusions are further reaffirmed with CRISK and LRISK remain negatively significant and the pandemic does not affect the risk – stability relations of Islamic banks in Indonesia.

Table 5.
Robustness Check: LSDVC Regression

	(1)	(2)	(3)
	STAB	**STAB**	**STAB**
L.STAB	0.135**	0.136**	0.132*
	(0.068)	(0.068)	(0.069)
CRISK	-0.672***	-0.668***	-0.675***
	(0.176)	(0.176)	(0.180)
LRISK	-3.339***	-3.333***	-3.159***
	(1.033)	(1.037)	(1.069)
COV19		0.047	-0.181
		(0.153)	(0.436)
CRISK x COV19			0.176
			(0.267)
LRISK x COV19			0.087
			(0.684)
LTA	-0.0002	-0.0002	-0.001
	(0.009)	(0.009)	(0.009)
LEV	5.330***	5.439***	5.031**
	(1.955)	(2.019)	(2.099)

Table 5.
Robustness Check: LSDVC Regression (Continued)

	(1)	(2)	(3)
	STAB	**STAB**	**STAB**
SIZE	0.389	0.353	0.376
	(0.258)	(0.299)	(0.310)
GDPG	-0.888	-0.877	-0.856
	(1.558)	(1.575)	(1.572)
INF	-3.863	-2.450	-2.027
	(8.644)	(9.533)	(9.479)
Obs.	203	203	203
AR(2) Stat.	-0.62	-0.65	-0.69
AR(2) P-val.	0.53	0.51	0.48

This table report robustness check using the bias-corrected least squares dummy variable (LSDVC) technique. Standard errors are in parentheses. *, ** and, *** indicate significant level at 10%, 5%, and 1% respectively.

4.3. Analysis

In Table 4 column 1, it is seen that the liquidity risk variable has a negative and significant effect on the Islamic bank stability at a significance level of 5%. Thus, H1 which states that bank liquidity risk has a negative effect on bank stability is supported. This is consistent with the findings of Ghenimi et al. (2021), Ghoul et al. (2011), Mohammad et al. (2020), and Ghenimi et al. (2017). If a bank finances many troubled projects, it will be difficult to meet the liquidity demands of depositors. In addition, banks likely face a bank run if the economic stand gets worse, which in turn will lower productive asset quality.

Hassan et al. (2019) argue that Islamic banks do face liquidity risk. The depositors allow Islamic banks to invest their fund for profit. Due to limited prospective projects, banks may find it difficult to earn profits and it may increase liquidity risk. Second, Islamic banks have limited access to money markets so as it complicates Islamic banks to raise funds during liquidity shortfall. Therefore, Islamic banks should keep more liquid assets to meet liquidity demand.

Credit risk has a negative and significant effect on Islamic bank stability. Thus, H2 is supported. The results confirm previous work (Djebali & Zaghdoudi, 2020; Ejoh et al., 2014; Ghenimi et al., 2017) in which the higher the credit risk is, the lower banks' financial stability is. We suggest that Islamic banks must carry out risk management as well as safeguard against moral hazard and minimize credit risk subsequently.

H3 dan H4 are not supported. This is in line with credit restructuring policy regulated in POJK No.11/POJK.03/2020. The statute instructs banks to lower interest rate, reduce principal and interest arrears, add loan facility and/or covert loan to temporal equity-based contract. In December 2020, the OJK revised the previous statute by POJK No.48/POJK.03/2020. Banks are required to not only restructure credit but also meet the liquidity and capital adequacy ratios determined by the financial authority (OJK). Therefore, these regulations have effectively reduced Islamic banks' exposure to risk.

V. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

Islamic banking in Indonesia is growing rapidly. In order to survive, the bank must maintain its stability. It is assumed that liquidity risk and credit risk affect bank stability. For this reason, this study analyzes the effect of liquidity risk and credit risk on the stability of Islamic banks in Indonesia. This study uses panel data comprising 14 Islamic commercial banks registered with the Financial Services Authority and quarterly financial data from 2017 to 2020, a total 244 quarterly-bank observations.

The study indicates that liquidity risk and credit risk have a negatively significant effect on the Islamic bank stability. The higher the level of liquidity risk and credit risk, the higher the degree of instability, and the more likely to be financially distressed the Islamic bank become. For this reason, Islamic banks have to concern with these risks by committing good risk management to maintain Islamic bank stability.

Our research has some limitations. First, the observed pandemic period covers only four quarters while the pandemic is still ongoing. Learning from the 2008 crisis, the impact could last long enough that the same pattern is possible in the COVID-19 crisis. Second, our research contribution is only on Islamic banks rather than conventional banks. Future research is expected to be able to compare the risk-stability relationship between Islamic and conventional banks during and after the pandemic.

5.2. Recommendations

This section provides recommendations for both Islamic banks and regulators based on the findings of the study. As our findings confirm the negative and significant effect of liquidity risk and credit risk on the stability of Islamic banks. Therefore, it is vital for Islamic banks to keep more liquid assets to meet liquidity demand and minimize credit risk. Islamic banks must carry out risk management as well.

Based on our work, the COVID-19 period does not shape risk-stability nexus in Islamic banks. Hence, this study confirms the success of countercyclical policy implemented by the Financial Services Authority (OJK). In addition, OJK as policymakers should continue to make countercyclical policies in addressing the adverse effects of the COVID-19 pandemic.

REFERENCES

Acharya, V. V, & Mora, N. (2015). A crisis of banks as liquidity providers. *The Journal of Finance*, *70*(1), 1–43.

Al-Khouri, R., & Arouri, H. (2019). Market power and the role of banks as liquidity providers in GCC markets. *Cogent Economics and Finance*, *7*(1), 1-17.

Al-Nasser Mohammed, S. A. S., & Muhammed, D. J. (2017). Financial crisis, legal origin, economic status and multi-bank performance indicators Evidence from Islamic banks in developing countries. *Journal of Applied Accounting Research*, *18*(2), 208–222.

Aldasoro, I., Fender, I., Hardy, B., & Tarashev, N. (2020). Effects of Covid-19 on the banking sector: The market's assessment. *BIS Bulletins*, *12*.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, *68*(1), 29–51.

Ari, A., Chen, S., & Ratnovski, L. (2021). The dynamics of non-performing loans during banking crises: A new database with post-covid-19 implications. *Journal of Banking & Finance*, *133*, 106140. https://doi.org/10.1016/j.jbankfin.2021.106140

Barber, H. (2018). How crisis poor is islamic finance? A comparative study of Islamic finance and conventional finance during and post financial crisis. *Qualitative Research in Financial Markets, 10*(4), 415-426.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, *87*(1), 115–143.

Boukhatem, J., & Djelassi, M. (2020). Liquidity risk in the Saudi banking system: Is there any Islamic banking specificity? *Quarterly Review of Economics and Finance*, *77*, 206–219. https://doi.org/10.1016/j.qref.2020.05.002

Bourkhis, K., & Nabi, M. S. (2013). Islamic and conventional banks' soundness during the 2007–2008 financial crisis. *Review of Financial Economics*, *22*(2), 68–77.

Bruno, G. S. F. (2005a). Estimation and inference in dynamic unbalanced panel-data models with a small number of individuals. *Stata Journal*, *5*(4), 473–500.

Bruno, G. S. F. (2005b). Approximating the bias of the LSDV estimator for dynamic unbalanced panel data models. *Economics Letters*, *87*(3), 361–366.

Bryant, J. (1980). A model of reserves, bank runs, and deposit insurance. *Journal of Banking and Finance*, *4*(4), 335–344.

Chen, W. Da, Chen, Y., & Huang, S. C. (2021). Liquidity risk and bank performance during financial crises. *Journal of Financial Stability*, *56*(June), 100906. https://doi.org/10.1016/j.jfs.2021.100906

Čihák, M., & Hesse, H. (2010). Islamic banks and financial stability: An empirical analysis. *Journal of Financial Services Research*, *38*(2), 95–113.

CNCB. (2020). *CNCB*.

Danarsari, D. N., Viverita, & Rokhim, R. (2018). Capital buffer for stronger bank stability: Empirical evidence from Indonesia's commercial banks. *Pertanika Journal of Social Sciences and Humanities*, *26*(August), 55–67.

Dang, V. A., Kim, M., & Shin, Y. (2015). In search of robust methods for dynamic panel data models in empirical corporate finance. *Journal of Banking and Finance*, *53*, 84–98. https://doi.org/10.1016/j.jbankfin.2014.12.009

Danisman, G. O., Demir, E., & Zaremba, A. (2021). Financial resilience to the covid-19 pandemic: The role of banking market structure. *Applied Economics*, *00*(00), 1–24. https://doi.org/10.1080/00036846.2021.1904118

Demirgüç-Kunt, A., Morales, A., & Ruiz Ortega, C. (2020). Banking sector performance during the covid-19 crisis. *SSRN Electronic Journal*, *August*. https://doi.org/10.2139/ssrn.3689789

Diamond, D. W., & Dybvig, P. H. (1983). Bank runs, deposit insurance, and liqudity. *Journal of Political Economy*, *91*(3), 401–419.

Diamond, D. W. (1984). Financial intermediation and delegated monitoring. *Review of Economic Studies*, *51*(3), 393–414.

Djebali, N., & Zaghdoudi, K. (2020). Threshold effects of liquidity risk and credit risk on bank stability in the MENA region. *Journal of Policy Modeling, 42*(5), 1049-1063.

Ejoh, N., Okpa, I., & Inyang, E. (2014). The relationship and effect of credit and liquidity risk on bank default risk among deposit money banks in Nigeria. *Research Journal of Finance and Accounting*, *5*(16), 142-150.

Elnahass, M., Trinh, V. Q., & Li, T. (2021). Global banking stability in the shadow of Covid-19 outbreak. *Journal of International Financial Markets, Institutions and Money*, *72*, 101322. https://doi.org/10.1016/j.intfin.2021.101322

Ferhi, A. (2018). Credit risk and banking stability: A comparative study between Islamic and conventional banks. *International Journal of Law and Management*, *60*(4), 1009–1019.

Ghenimi, A., Chaibi, H., & Omri, M. A. B. (2021). Liquidity risk determinants: Islamic vs conventional banks. *International Journal of Law and Management*, *63*(1), 65-95.

Ghenimi, A., Chaibi, H., & Omri, M. A. B. (2017). The effects of liquidity risk and credit risk on bank stability: Evidence from the MENA region. *Borsa Istanbul Review*, *17*(4), 238–248.

Ghoul, S. El, Guedhami, O., Kwok, C. C. Y., & Mishra, D. (2011). Does corporate social responsibility affect the cost of capital? *Journal of Banking & Finance*, *35*(9), 2388–2406.

Goodell, J. W. (2020). COVID-19 and finance: Agendas for future research. *Finance Research Letters*, *35*(July), 101512. https://doi.org/10.1016/j.frl.2020.101512

Gupta, J., & Kashiramka, S. (2020). Financial stability of banks in India: Does liquidity creation matter? *Pacific-Basin Finance Journal*, *64*(September), 101439. https://doi.org/10.1016/j.pacfin.2020.101439

Hasan, M. M., & Dridi, J. (2010). The effects of the global crisis on Islamic and conventional banks: A comparative study. *International Monetary Fund Working Paper No.10/201*, (September 2010), available at SSRN: https://ssrn.com/abstract=1750689

Hassan, M. K., Khan, A., & Paltrinieri, A. (2019). Liquidity risk, credit risk and stability in Islamic and conventional banks. *Research in International Business and Finance*, *48*(November 2018), 17–31.

Hayakawa, K. (2007). Small sample bias properties of the system GMM estimator in dynamic panel data models. *Economics Letters*, *95*(1), 32–38.

Hirata, W., & Ojima, M. (2020). Competition and bank systemic risk: New evidence from Japan's regional banking. *Pacific-Basin Finance Journal*, *60*(February), 101283. https://doi.org/10.1016/j.pacfin.2020.101283

Ibrahim, M. H., & Rizvi, S. A. R. (2017). Do we need bigger Islamic banks? An assessment of bank stability. *Journal of Multinational Financial Management*, *40*, 77–91. https://doi.org/10.1016/j.mulfin.2017.05.002

Imbierowicz, B., & Rauch, C. (2014). The relationship between liquidity risk and credit risk in banks. *Journal of Banking and Finance*, *40*(1), 242–256.

Khan, M. S., Scheule, H., & Wu, E. (2017). Funding liquidity and bank risk taking. *Journal of Banking and Finance*, *82*, 203–216. https://doi.org/10.1016/j.jbankfin.2016.09.005

Kim, D., & Sohn, W. (2017). The effect of bank capital on lending: Does liquidity matter? *Journal of Banking and Finance*, *77*, 95–107. https://doi.org/10.1016/j.jbankfin.2017.01.011

Lassoued, M. (2018). Comparative study on credit risk in Islamic banking institutions: The case of Malaysia. *Quarterly Review of Economics and Finance*, *70*, 267–278. https://doi.org/10.1016/j.qref.2018.05.009

Ledhem, M. A., & Mekidiche, M. (2021). Islamic finance and economic growth nexus: an empirical evidence from Southeast Asia using dynamic panel one-step system GMM analysis. *Journal of Islamic Accounting and Business Research*, *12*(8), 1165–1180.

Lepetit, L., & Strobel, F. (2015). Bank insolvency risk and Z-score measures: A refinement. *Finance Research Letters*, *13*(May), 214–224.

Lestari, R. (2020). *Singapura Dilanda Resesi, Awas! Ini Dampaknya ke Indonesia* [Singapore Hit by Recession, Watch Out! This Impact to Indonesia]. Bisnis Com.

Louhichi, A., & Boujelbene, Y. (2017). Bank capital, lending and financing behaviour of dual banking systems. *Journal of Multinational Financial Management*, *41*(september 2017, 61–79.

Mahdi, I. B. S., & Abbes, M. B. (2018). Relationship between capital, risk and liquidity: A comparative study between Islamic and conventional banks in MENA region. *Research in International Business and Finance*, *45*(October 2018), 588–596.

Mazur, M., Dang, M., & Vega, M. (2021). COVID-19 and the march 2020 stock market crash. Evidence from S&P1500. *Finance Research Letters*, *38*(march), 101690. https://doi.org/10.1016/j.frl.2020.101690

Mohammad, S., Asutay, M., Dixon, R., & Platonova, E. (2020). Liquidity risk exposure and its determinants in the banking sector: A comparative analysis between Islamic, conventional and hybrid banks. *Journal of International Financial Markets, Institutions and Money*, *66*, 101196.

Nicola, M., Alsafi, Z., Sohrabi, C., Ahmed, K., Al-Jabir, A., Iosifidis, C., & Agha, R. (2020). The socio-economic implications of the coronavirus pandemic (COVID-19): A review. *International Journal of Surgery*, *78*(June 2020), 185–193.

OJK. (2021). Sharia Banking Statistics. In *OJK*.

Ovi, N., Bose, S., Gunasekarage, A., & Shams, S. (2020). Do the business cycle and revenue diversification matter for banks' capital buffer and credit risk: Evidence from ASEAN banks. *Journal of Contemporary Accounting and Economics*, *16*(1), 100186. https://doi.org/10.1016/j.jcae.2020.100186

Ozili, P. K. (2018). Banking stability determinants in Africa. *International Journal of Managerial Finance*, *14*(4), 1743–9132.

Park, C.-Y., & Shin, K. (2021). Covid-19, nonperforming loans, and cross-border bank lending. *Journal of Banking & Finance*, *133*(December 2021), 106233. https://doi.org/10.1016/j.jbankfin.2021.106233

Rizwan, M. S., Ahmad, G., & Ashraf, D. (2020). Systemic risk: The impact of covid-19. *Finance Research Letters*, *36*(October), 101682.

Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *Stata Journal*, *9*(1), 86–136.

Saunders, A., & Cornett, M. M. (2014). *Financial institutions management: A risk management approach* (Eighth edition). New York: McGraw-Hill Education.

Smaoui, H., Mimouni, K., Miniaoui, H., & Temimi, A. (2020). Funding liquidity risk and banks' risk-taking: Evidence from Islamic and conventional banks. *Pacific-Basin Finance Journal*, *64*, 101436.

Sobarsyah, M., Soedarmono, W., Yudhi, W. S. A., Trinugroho, I., Warokka, A., & Pramono, S. E. (2020). Loan growth, capitalization, and credit risk in Islamic banking. *International Economics*, *163*, 155–162.

Soto, M. (2005). System GMM estimation with a small sample. *Working Papers No. 395*. https://ideas.repec.org/p/bge/wpaper/395.html

Thornton, J., & Tommaso, C. di. (2019). Liquidity and capital in bank lending: Evidence from European banks. *Finance Research Letters*, *34*, 101273.

Topcu, M., & Gulal, O. S. (2020). The impact of covid-19 on emerging stock markets. *Finance Research Letters*, *36*, 101691.

Wagner, W. (2007). The liquidity of bank assets and banking stability. *Journal of Banking and Finance*, *31*(1), 121–139.

Werner, R. A. (2016). A lost century in economics: Three theories of banking and the conclusive evidence. *International Review of Financial Analysis*, *46*, 361–379. https://doi.org/10.1016/j.irfa.2015.08.014

Zaghdoudi, K. (2019). The effects of risks on the stability of Tunisian conventional banks. *Asian Economic and Financial Review*, *9*(3), 389–401.

Zhang, D., Hu, M., & Ji, Q. (2020). Financial markets under the global pandemic of COVID-19. *Finance Research Letters*, *36*, 101528.